Agricultural control of Radopholus similis in banana and plantain plantations

Israël Tankam Chedjou
University of Yaounde I, Yaounde, Cameroon

Suzanne Touzeau
Université Côte d'Azur, INRA, CNRS, ISA, France
Université Côte d'Azur, Inria, INRA, CNRS, Sorbonne Université, BIOCORE, France

Frédéric Grognard
Université Côte d'Azur, Inria, INRA, CNRS, Sorbonne Université, BIOCORE, France

Ludovic Mailleret
Université Côte d'Azur, INRA, CNRS, ISA, France
Université Côte d'Azur, Inria, INRA, CNRS, Sorbonne Université, BIOCORE, France

Jean Jules Tewa
University of Yaounde I, Yaounde, Cameroon

The nematode *Radopholus Similis* is the most significant parasitic nematode of the banana plant and the banana plantain plant in the world. *R. Similis* feeds on the root tissues and causes damages going from simple root lesions, reducing the crop yield, to the fall of seedlings. Because of these damages, *R. similis* is one of the most regulated pests of plant but its control still implies toxic nematicides with limited efficiency and harmful ecological impact.

Our global aim is to design more efficient and sustainable control strategies, including alternative methods to nematicides such as crop rotation or fallow practice. Our approach is based on a hybrid model describing the plant-nematode interactions over several cropping seasons. During the fallow, in the absence of host, the pest population undergoes a rapid decay.

We formulate an optimisation problem to determine the fallow periods that maximise the multi-seasonal yield over a finite and fixed time horizon. Two cases are considered: a constant or variable fallow periods. The existence of an optimal solution is proven and its location is computed. Numerical simulations are provided to illustrate our results.

.